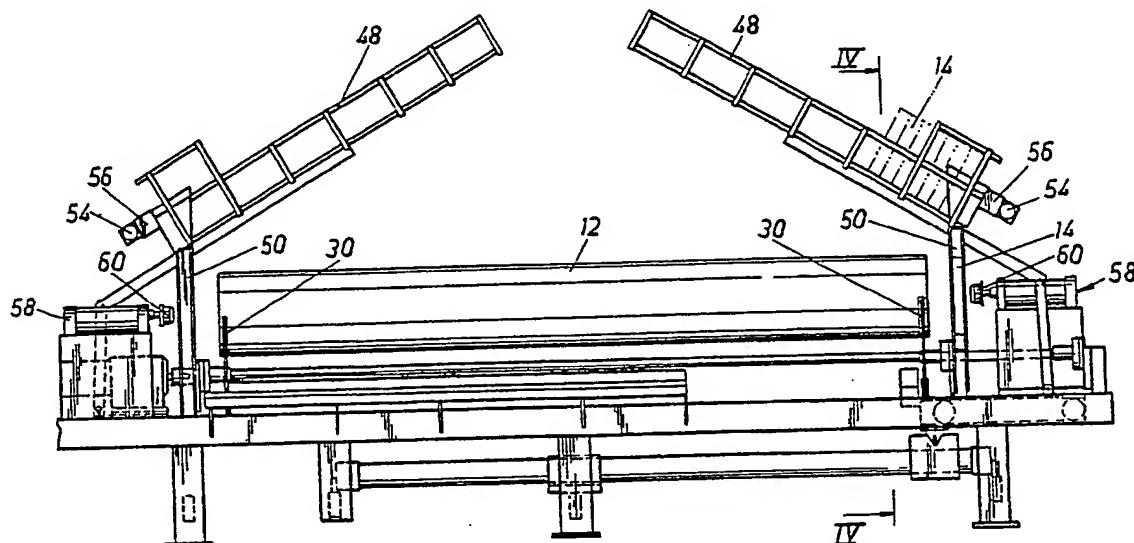




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(54) Title: PLUG APPLICATOR AND AUXILIARY EQUIPMENT



**(57) Abstract**

A plug applicator (10) intended for the application of plugs (14) into the two end openings of tubular sleeves (12), said sleeves being intended for use as cores onto which paper webs are wound in paper mills. Fork-shaped means (30) are arranged to retain said tubular sleeves (12) in positions opposite plug collector means (50) positioned at either end of the tubular sleeve (12). Each one of the two plugs (14) is pushed into the respective tubular sleeve opening by means of its respective plunger (60), said plungers provided on carriages (58) which are arranged for coordinate movements in the lengthwise direction of the tubular sleeve. The fork-shaped means (30) are operable between a tubular sleeve reception position,

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Plug Applicator and Auxiliary Equipment

The subject invention concerns a plug applicator and auxiliary equipment for automatic application of plugs into the openings of the type of tubular sleeves which are intended to serve as cores for 5 winding paper webs thereon in paper mills.

In the paper mill the tubular sleeves are transported, stored, picked, transferred and handled in many other ways. Several of these operations are performed manually according to traditional techniques and thus these operations are inefficient and therefore work-consuming. 10 The tubular sleeve handling operations are also difficult to integrate into the overall control systems governing the manufacturing process in paper mills.

The purpose of the subject invention is to provide a plug applicator which is adapted to perform automatized and efficient 15 application of plugs into the end openings of tubular sleeves. The plug applicator in accordance with the invention is intended to be incorporated as a part of an automatic system devised to handle tubular sleeves in a paper mill, which system is adapted to be computer controlled. It is likewise possible to use the plug applicator and its 20 auxiliary equipment as the first stage in the transition from manual handling of tubular sleeves to the automatic handling operations thereof.

The purpose of the invention outlined above are achieved therein that the applicator comprises means to retain a tubular sleeve in the 25 desired position during the application of plugs into its end openings, means for advancing the plugs to a position on either end of the tubular sleeve opposite the end openings thereof and means for pressing the plugs into the end openings of the tubular sleeve.

Further characteristics of the invention will appear from the 30 dependent claims.

The invention will be described in closer detail in the following with reference to the accompanying drawings, wherein

Fig. 1 is an overall perspective view of a plug applicator in accordance with the invention and its auxiliary equipment,

35 Fig. 2 is a lateral view of the plug applicator,

Fig. 3 is a detail view of a plug supply and a plug advancing device arranged to dispense plugs,

Fig. 4 is a cross-sectional view of the plug applicator along line IV-IV of Fig. 2,

5 Fig. 5 is a principal lateral view of the mechanism incorporated in the plug applicator to manipulate the tubular sleeve during the plug application operation.

Fig. 1 is an overall view of a plug applicator 10 in accordance with the invention and its auxiliary equipment. Tubular sleeves 12 are 10 advanced one by one up to the plug applicator 10 where they are provided with plugs 14 which are inserted into the sleeve openings 16. The tube sleeves 12 are then moved to a vertically movable table 18, from which they may be pushed onto a carriage 20 for further transport and handling by means of a plate 24 which is movable between guide 15 rails 22 along the table 18.

Fig. 5 shows how an individual tubular sleeve 12 is manipulated in the plug applicator 10. Tubular sleeves 12 are moved onto a table 26 which tilts towards the plug applicator 10 and with the aid of a pawl 28 one sleeve 12 at a time is allowed to move forwards onto a pair of 20 fork-shaped means 30 which are pivotally mounted on the plug applicator 10. The fork-shaped means may be pivoted by means of an actuating piston-and-cylinder unit 32 which is pivotally mounted on the stand 34 of the plug applicator. The fork-shaped means 30 may be pivoted between a first position for reception of a tubular sleeve 12 (shown in 25 dash-and-dot lines 30 (I) in Fig. 5), a second position for mounting the plugs 16 (shown in continuous lines 30 (II)) and a third position for discharging the tubular sleeve 12 having been provided with its plugs 16 (shown in dash-and-dot lines 30 (III)). The tubular sleeve 12 is advanced onto a table 36 which slopes towards the vertically movable 30 table 22. Also the table 36 is provided with a pawl corresponding to the pawl 18 to ensure regulated and controlled advancement of the tubular sleeves 12, one at a time.

The piston rod 38 of the piston-and-cylinder unit 32 is pivotally mounted at its upper end to a mounting shaft 40 on the link 35 42 comprising the fork-shaped means 30. The mounting shaft 40 is

displaced relative to the pivot shaft 44 of the link 42. The fork-shaped means 30 is pivoted to its various positions 30 (I, II, III) upon movement of the mounting shaft 40 of the piston rod 32 to the positions 40 (I, II, III) indicated in Fig. 5.

5 When tubular sleeves having a smaller diameter are to be handled the fork-shaped means 30 are pivoted over 180° whereby the lower fork-profile means 46, indicated in Fig. 5, will face upwards on the link 42.

Fig. 2 shows the manner in which the fork-shaped means 30 retain 10 a tube sleeve 12 in position while plugs 14 are being mounted into the two sleeve openings 16. The plugs 14 are stored in two supplies 48 which are located above the plug applicator 10 proper and which slope outwards/downwards towards to collector members 50 located one at either end of the tubular sleeve 12. The two supplies 48 preferably are 15 displaced laterally (see Figs. 3 and 4) in opposite directions relative to the plug applicator 10. The collector members 50 are arranged to retain one plug 14 each in position opposite the associated opening 16 at either end the tubular sleeve 12.

At the lower end of the supplies 48 a vertical channel 52 is 20 provided (see Fig. 3). A pusher 56 mounted on a cylinder or a positioning means 43 (indicated in Fig. 2) advances the plugs 14 inside the channel 52 one by one laterally relative to the supplies 48 to the collector members 50, wherein the plug 14 assumes the position shown in Fig. 3 opposite an opening 16 of a tubular sleeve 12 positioned in the 25 fork-shaped means 30.

The plug applicator 10 comprises two carriages 58, one at either sleeve end and arranged for coordinated movement towards the tubular sleeve 12 supported in the fork-shaped means 30. The carriages 58 are provided with one plunger 60 each which plungers are arranged, upon the 30 coordinated movements of the carriages 58 towards the tubular sleeve 12, to push the plugs 14 positioned in the collectors 50 into the openings 16 of the tubular sleeve 12 supported in the fork-shaped means 30.

The operations required to apply the plugs by means of the plug applicator 10 are automatically synchronized and may be computer controlled. It is likewise possible to control the process manually. A buffer supply of plugs 14 may be arranged in the supplies 48. The supplies 48 are easily accessible from above for refill.

5 The automatic operation provided by the plug applicator increases the efficiency in the paper mill. The improved control of the tube sleeve manipulating operation which is achieved by the invention means that in operation improved control of the flow of material can be 10 obtained as concerns the sleeves.

The embodiment of the invention described above is to be regarded as one example only and a variety of modifications are possible within the scope of the appended claims. The carriages 58 may be replaced by overhead-type structures which are operated by 15 positioning means or positioning cylinders.

It is also possible to provide in the plug applicator 10 more than two coordinate pivotal movement stands 34 having fork-shaped means 30, 46. In this manner, the plug applicator 10 may be easily adjusted to manipulate tubular sleeves 12 of different lengths.

20 The stands 34 could also be provided with more than two fork-shaped means 30, 42 for simple adaptation of the plug applicator 10 to tubular sleeves of different diameters.

CLAIMS

1. A plug applicator and auxiliary equipment for the application of plugs (14) into the end openings (16) of tubular sleeves (12), characterized by means (30, 46, 32) arranged to 5 retain a tubular sleeve (12) in the desired position during the application of plugs (14) into the sleeve end openings, means (48, 50, 52, 56) for advancing the plugs (14) to positions on either side of the tubular sleeve (12) opposite the end openings thereof and means (58, 60) for pressing the plugs (14) into the end openings of the tubular 10 sleeve (12).
2. A plug applicator as claimed in claim 1, characterized therein that the means designed to retain a tubular sleeve (12) in the desired position while the plugs are being pressed into the end openings are fork-shaped means (30, 46), said means being pivotable 15 for movement between a first position (30(I)) for supporting a tubular sleeve (12), a second position (30(II)) in which the plugs (14) are pressed into the two end openings of the tubular sleeve, and a third position (30(III)) for discharge of the tubular sleeve (12) having been provided with its plugs (14).
- 20 3. A plug applicator as claimed in claim 1 or 2, characterized therein that the plugs (14) are stored in supplies (48) and in that the discharge means (54, 56) are arranged to dispense one plug (14) at a time from the associated supply (48) and with the aid of guide means (50, 52) displace said plugs to a position opposite the 25 end openings of a tubular sleeve (12).
4. A plug applicator as claimed in any one of the preceding claims, characterized therein that push-in means (60) which are mounted on movable carriages arranged to perform coordinate movements, are arranged to push the plugs (14) into the end openings of 30 the tubular sleeves.
5. A plug applicator as claimed in claim 2, characterized by a pivotally mounted piston-and-cylinder unit (32) to actuate said fork-shaped means (30, 46) designed to retain said tubular sleeves (12), for the displacement of said fork-shaped means between 35 the different positions (30(I), 30(II) and 30(III)) thereof.

6. A plug applicator as claimed in any one of the preceding claims, characterized therein that a table (26) which slopes towards the plug applicator (10) and which is designed to advance tubular sleeves (12) thereon up to the fork-shaped means (30, 5 46) is provided with a pawl (28) which may be adjusted for controlled and regulated advancement of said tubular sleeves (12).

7. A plug applicator as claimed in any one of the preceding claims, characterized therein that a vertically movable table (18) is arranged to receive the tubular sleeves (12) when 10 provided with their respective plugs (14) and to convey said sleeves for further handling.

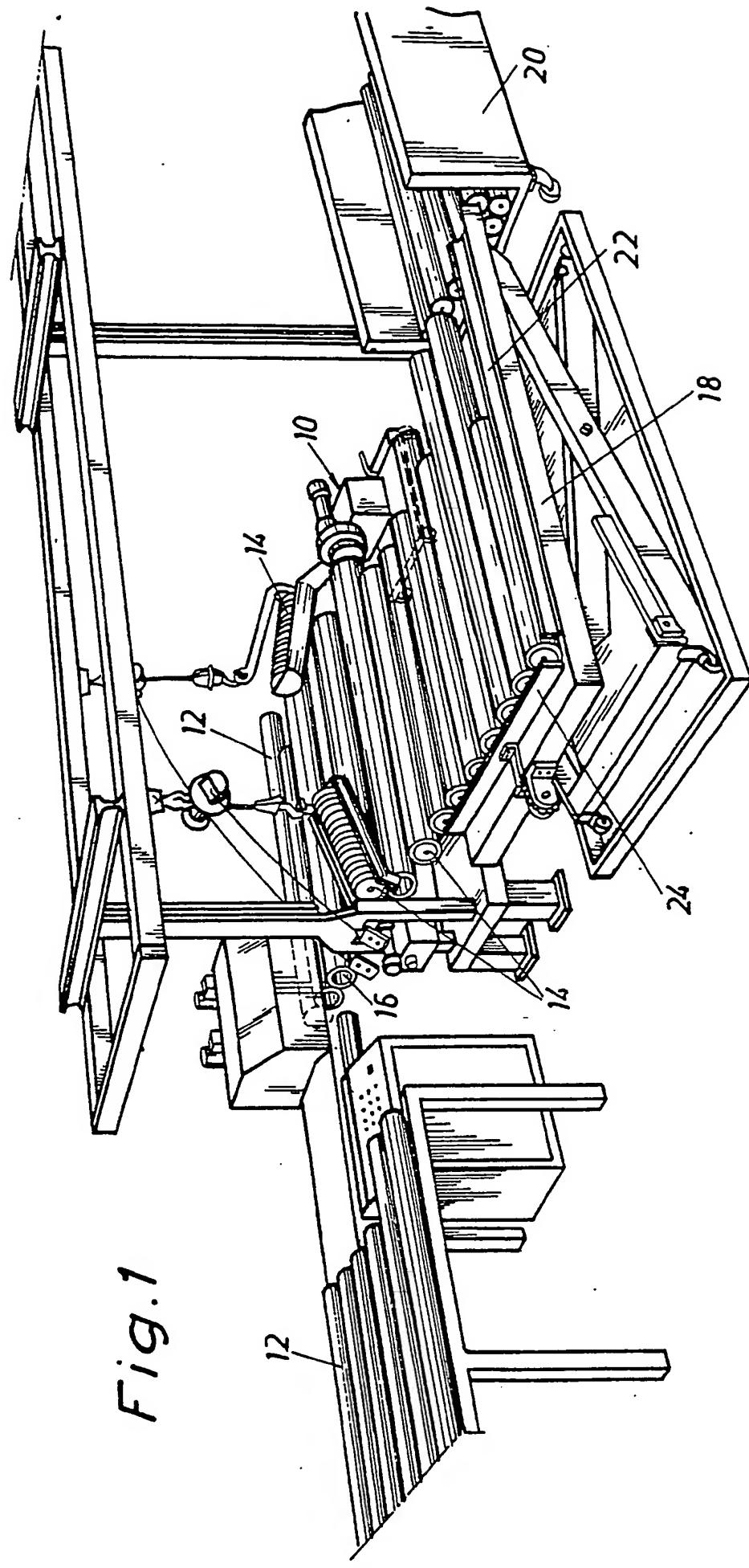
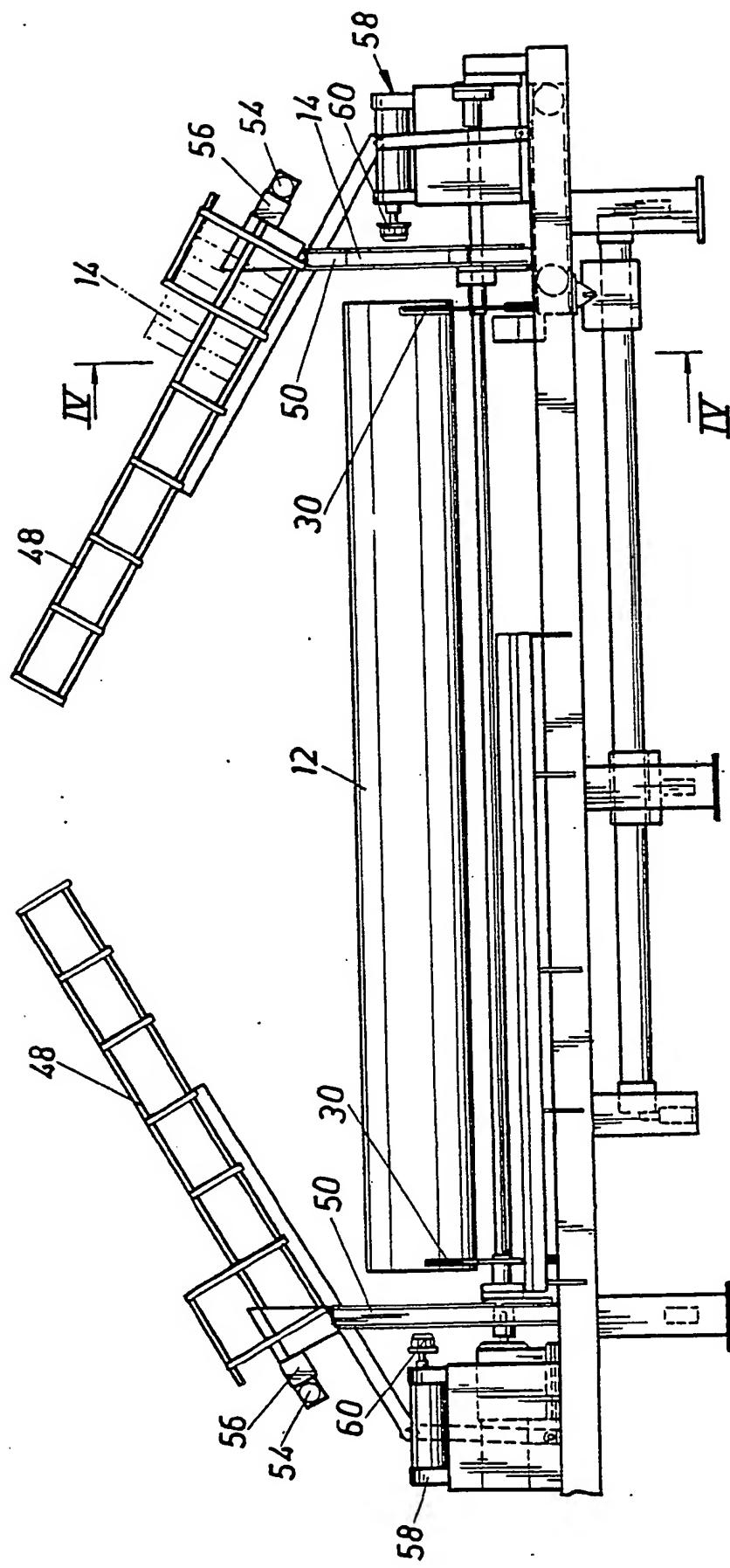


Fig. 1

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Fig. 2



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Fig.3

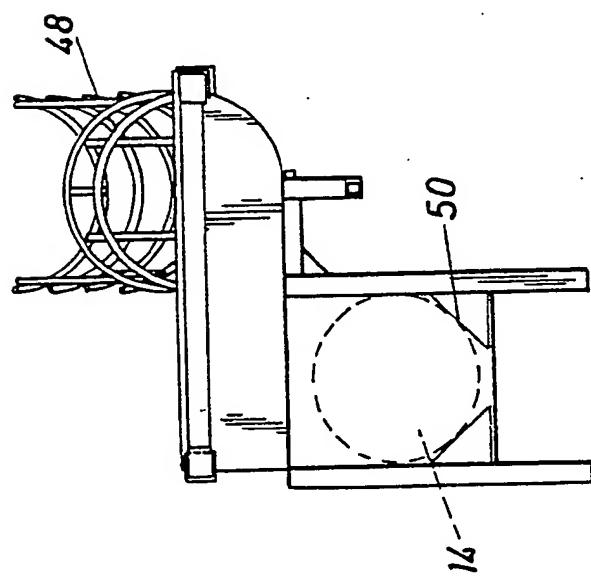
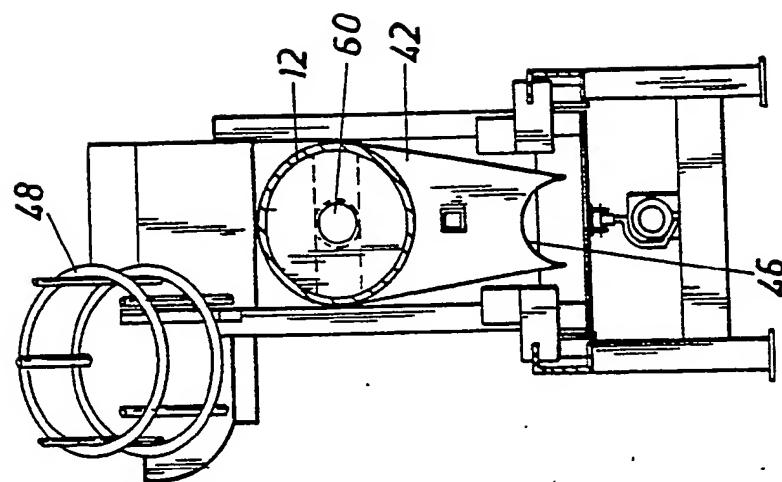
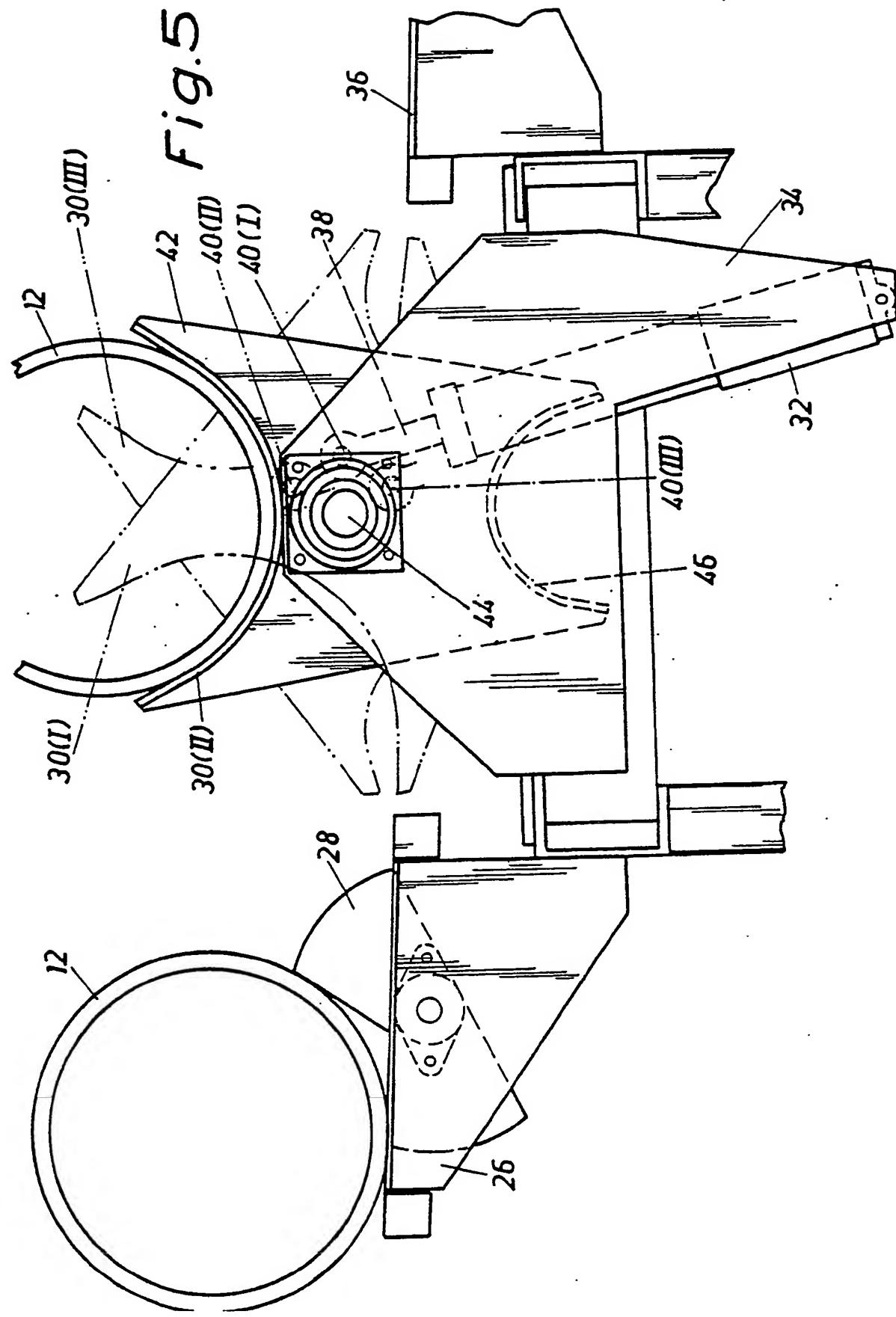


Fig.4



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# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE86/00115

## I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) \*

According to International Patent Classification (IPC) or to both National Classification and IPC 4

B 31 B 17/74

## II. FIELDS SEARCHED

Minimum Documentation Searched 7

Classification System	Classification Symbols
IPC 4 US Cl	B 31 B 17/00, /60-/74 493: 156, 308

Documentation Searched other than Minimum Documentation  
to the Extent that such Documents are Included in the Fields Searched \*

SE, NO, DK, FI classes as above

## III. DOCUMENTS CONSIDERED TO BE RELEVANT\*

Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. 13
X	DE, C, 648 563 (MAJER C) 6 August 1937 see p 5, lines 34-68; figs 11-15	1,2,3

- \* Special categories of cited documents: <sup>10</sup>
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## IV. CERTIFICATION

Date of the Actual Completion of the International Search

1986-06-02

Date of Mailing of this International Search Report

1986-06-05

International Searching Authority

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Petter Sörsdahl